Calculus III, Mathematics 2210-90

Examination 3, Nov 13,15, 2003

You may use graphing calculators and a Table of Integrals. Each problem is worth 20 points. You MUST show your work. Just the correct answer is not sufficient for any points.

1. Find
$$\iint_R (1 - x^2 - y^2) dx dy$$

where R is the region in the plane bounded by the curves $y = 0, y = x^2, x = 1$.

2. Find the volume of the solid under the surface $z = 9 - x^2 - y^2$ and over the disk $x^2 + y^2 \leq 9$, and between the planes y = 0 and y = x.

3. Find the area of the piece of the surface $z = x^2 - y^2$ lying over the disk $x^2 + y^2 \le 4$.

4. Find the area of the parallelogram bounded by the lines

$$2x + y = 1$$
, $2x + y = 3$, $y = x$, $y = x + 4$.

5. The region in 3 dimensions bounded by the planes

$$x = 0, y = 0, z = 0, x = 1, y = 1, z = x + y$$

is filled with an inhomogeneous mud whose density is $\delta(x, y, z) = 2 - z$. Find the mass of mud in this region.